

# Educational Activities at Draper Laboratory

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Draper provides a stimulating R&D environment for graduate students working toward advanced degrees, undergraduate students pursuing research opportunities, and government and industry employees wishing to study advances in technology. Students have opportunities to work on challenging projects from conception through development and operation, under real-world cost and time constraints. An example of this is the Vorticity Control Unmanned Underwater Vehicle (VCUUV). Draper's first incumbent in the Solomon J. Buschsbaum Postdoctoral Fellowship, Dr. Jamie Anderson is leading a team of graduate and undergraduate students in developing a prototype VCUUV (or Robotic Fish), which employs fish-like propulsion for reduced drag and enhanced maneuvering. Initial testing of the VCUUV is expected to begin in 1998.

Draper's R&D setting allows students to gain invaluable experience applicable to their future professions. Various educational programs are developed and administered by Draper's Education Office:

- The Draper Fellow program (for military and civilian personnel).
- The Post Doctoral program.
- Military residents, interns, and associates.
- MIT Engineering Internship programs.
- Co-op programs with Boston University, MIT, Northeastern, Tufts, and Wentworth.
- Research opportunities for students, including Sea Grant and Space Grant programs.
- The Professional Summer Program (short courses for Department of Defense personnel) cosponsored with MIT.
- Presentations and tours for visiting faculty and student groups (including a visit by Ukrainian businessmen sponsored by the U.S. State Department).
- Partnerships with area K-12 schools.

During 1997, the Draper Fellow program consisted of 64 students from MIT, Boston University, Northeastern University, Tufts, and the University of Massachusetts at Lowell. Several theses were completed this year and are listed below.

**Barchers, J.D.; Deutsch, O.L. (Supervisor)**

*Entry guidance for abort scenarios*  
Master of Science Thesis

**Bennett, J.**

*Packaging and interconnection of a back-lit CCD sensor device*  
Master of Science Thesis

**Bosse, M.C.**

*A vision augmented navigation system for an autonomous helicopter*  
Master of Science Thesis

**Bruce, D.M.; Kumar, K. (Supervisor)**

*Effects of high temperature treatment on curl and microstructure of heavily boron doped silicon*  
Master of Science Thesis

**Cho, J.**

*Electronic subsystems of a free-swimming robotic fish*  
Master of Engineering Thesis

**Christodouleas, J.D.; Ricard, M.J. (Supervisor)**

*Solution methods for multiprocessor network scheduling problems, with application to railroad operations*  
Doctor of Philosophy Thesis

**Gibbons, K.A.; Weinberg, M.S. (Supervisor)**

*A micromechanical silicon oscillating accelerometer*  
Master of Science Thesis

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**Higginson, J.E.; Martorana, R.T. (Supervisor)**

*Mapping value creation in research and development*  
Master of Business Administration Thesis

**Kantsiper, B.**

*A systematic approach to station-keeping of constellations of satellites*  
Doctor of Philosophy Thesis

**Kim, J.Y.; Kang, D.S. (Supervisor)**

*Modeling and control of a small autonomous vehicle*  
Master of Science Thesis

**King, C.M.; Tuohy, S.T. (Supervisor)**

*An advanced, integrated display system for small, high-speed marine craft*  
Bachelor and Master of Science Thesis

**Koontz, B.S.; Kang D.S. (Supervisor)**

*A multiple vehicle mission planner to clear unexploded ordnance from a network of roadways*  
Master of Science Thesis

**Kossuth, J.**

*Optimization of a micromechanical single-element oscillator using nonlinear electrostatic control*  
Doctor of Philosophy Thesis

**McConley, M.W.; Appleby, B.D. (Supervisor)**

*A computationally efficient Lyapunov-based procedure for control of nonlinear systems with stability and performance guarantees*  
Doctor of Philosophy Thesis

**Park, T.H.; Kang D.S. (Supervisor)**

*An autonomous mission manager multiple vehicle system*  
Master of Science Thesis

**Pien, H.H.**

*R&D management and the use of dynamic metrics*  
Master of Science Thesis

**Puri, V.; Fuhry, D.P. (Supervisor)**

*Tightly coupled GPS-gyro integration for spacecraft attitude determination*  
Master of Science Thesis

**Sauer, B.M.; Ricard, M.J. (Supervisor)**

*Autonomous mission scheduling for satellite operations*  
Master of Science Thesis

**Schwarz, R.E.**

*A probabilistic model of the effects of satellite system automation on cost and availability*  
Master of Science Thesis

**Shah, N.H.; Proulx, R.J. (Supervisor); Cefola, P.J. (Supervisor)**

*Automated station-keeping for satellite constellations*  
Master of Science Thesis

**Trott, C.A.; DeBitetto, P.A. (Supervisor)**

*Electronics design for an autonomous helicopter*  
Bachelor and Master of Science Thesis

**Wilson, E.C.; Kang D.S. (Supervisor)**

*A modular expandable design for mobile robot control software*  
Bachelor of Science and Master of Engineering Thesis

